



Energy & Environmental Research Center (EERC)

INITIAL ENGINEERING, TESTING, AND DESIGN OF A COMMERCIAL-SCALE POSTCOMBUSTION CO₂ CAPTURE SYSTEM ON AN EXISTING COAL-FIRED GENERATING UNIT

CO₂ Capture Technology Project Review Meeting
August 14, 2018
Pittsburgh, Pennsylvania


Jason Laumb, Principal Engineer

Critical Challenges. **Practical Solutions.**

PROJECT TEAM AND INDUSTRY SPONSORS

- State of North Dakota – Mike Holmes, LEC/LRC
- ALLETE (BNI, ACE, and MP) – Bill Sawyer
- Minnkota Power – Craig Bleth, Stacey Dahl
- MHI – Tim Thomas, Mike Fowler
- Burns & McDonnell – Ronald Bryant
- EERC – Jason Laumb



A Touchstone Energy® Cooperative 



GOALS AND OBJECTIVES

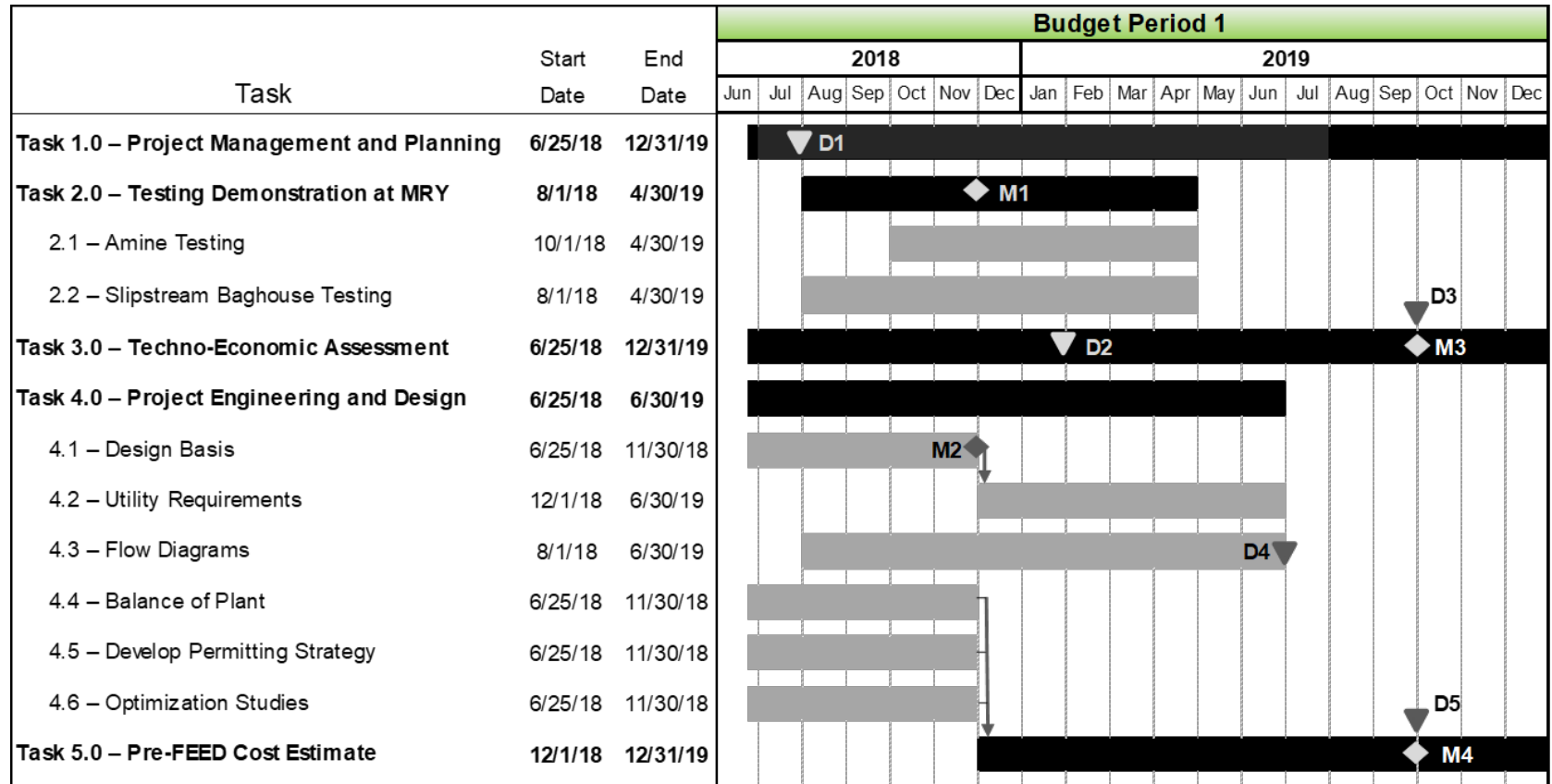
- The goal of the project is to determine retrofit costs for a postcombustion CO₂ capture system on an existing coal-fired electric generating unit. Specific objectives to support this goal include the following:
 - Design a fully integrated postcombustion CO₂ capture system for Milton R. Young Unit 2 (MRY2).
 - Evaluate KS-1 solvent on lignite coal-derived flue gas to refine critical design parameters.
 - Complete a techno-economic assessment (TEA) in accordance with DOE's bituminous baseline study (B12B).
 - Complete a pre-front-end engineering and design (FEED) analysis of the specified postcombustion CO₂ capture system at MR2.

PROJECT STRUCTURE

- Task 1 – Project Management and Planning
- Task 2 – Testing Demonstration at MRY2
- Task 3 – Techno-Economic Assessment
- Task 4 – Project Engineering and Design
- Task 5 – Pre-FEED Cost Estimate



PROJECT TIME LINE

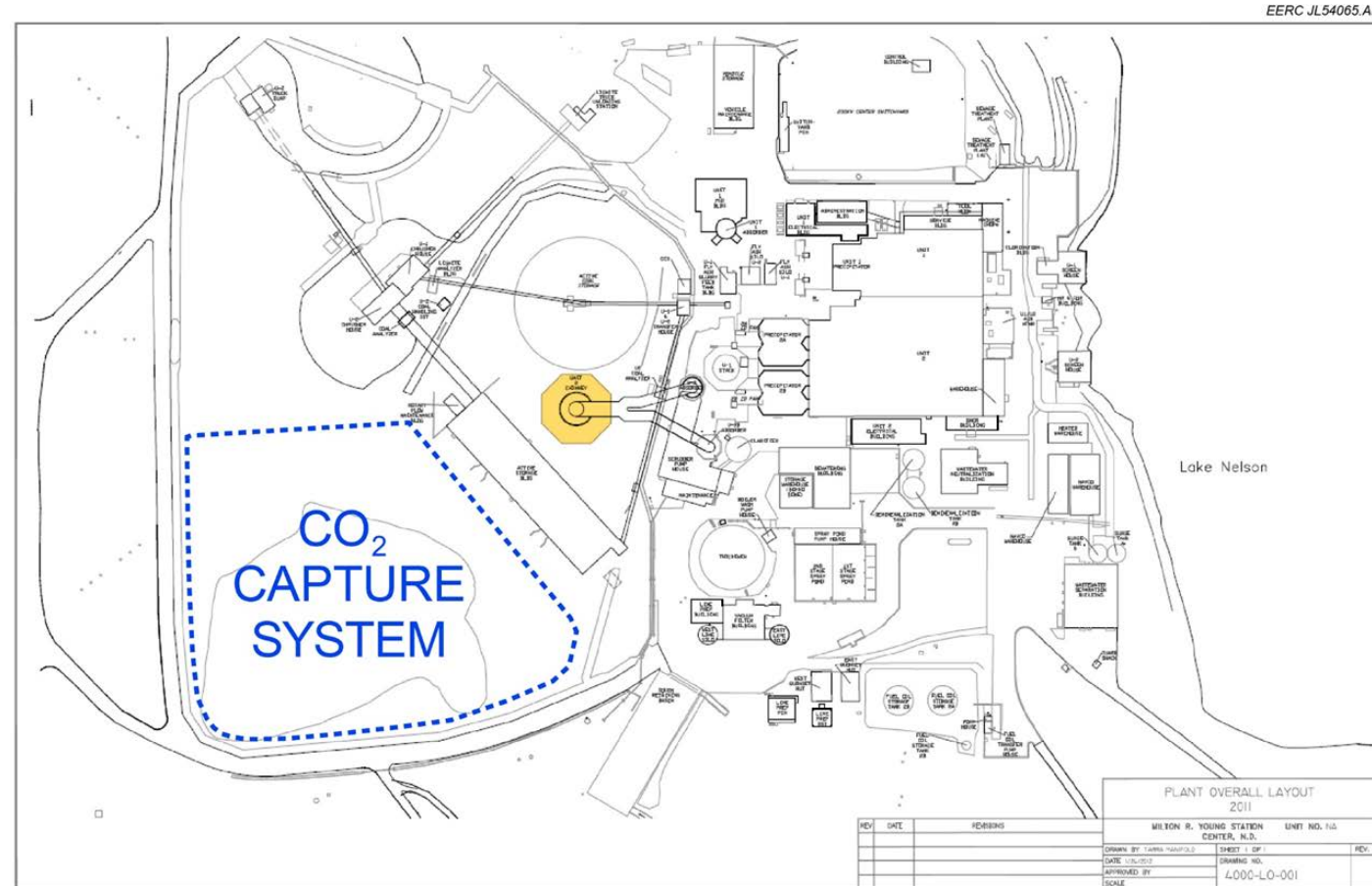


LR 7/18/18

Deliverables ▼	Milestones ◆
D1 – Updated PMP	M1 – Initiated Field Testing
D2 – Updated TMP	M2 – Design Basis Determined
D3 – Complete TEA	M3 – Complete TEA
D4 – HAZOP Review	M4 – Complete Preliminary Pre-FEED Analysis
D5 – Constructability Review	

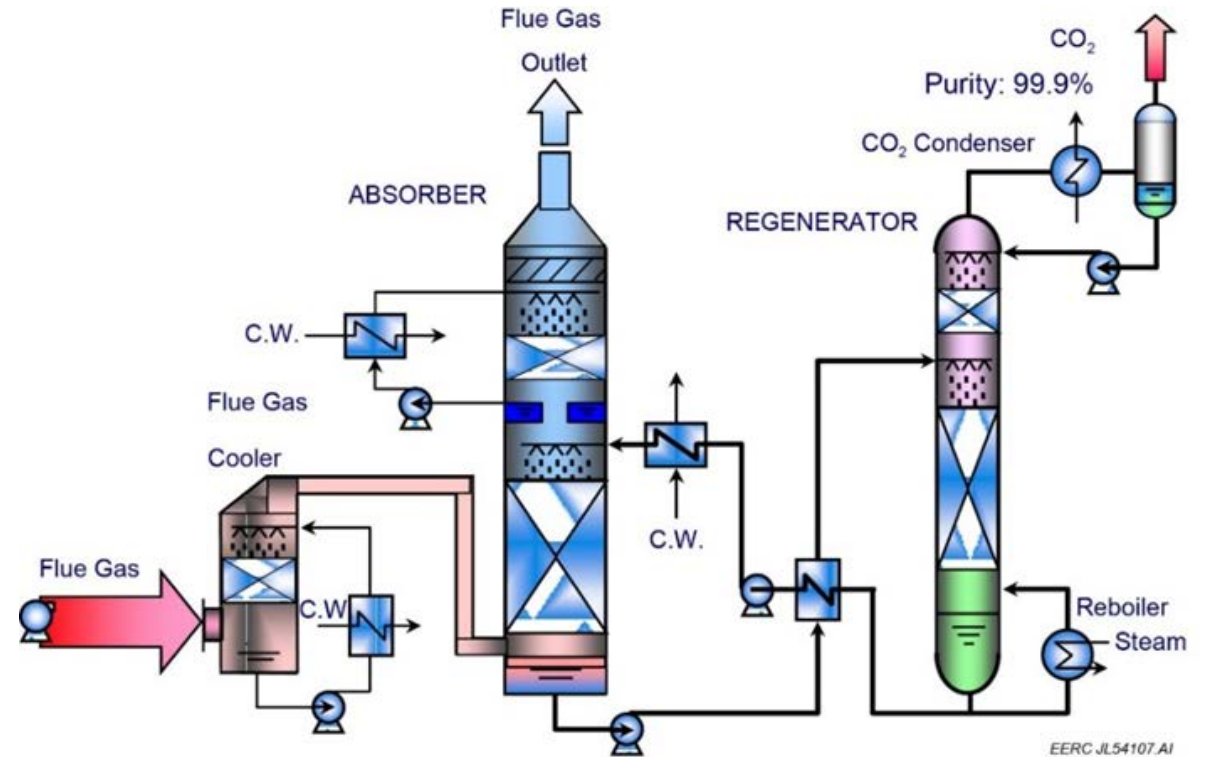
PROJECT DETAILS – MRY2

- Minnkota Power MRY2
 - 477-MW lignite-fired unit
 - ◆ OFA
 - ◆ SNCR
 - ◆ Halogenated PAC
 - ◆ ESP
 - ◆ Wet FGD
 - Provides power to eastern North Dakota and northern Minnesota



PROJECT DETAILS – CAPTURE TECHNOLOGY

- MHI Capture Technology
 - KM CDR Process (KS-1 Solvent)
 - ◆ Flue gas pretreatment
 - ◆ CO₂ recovery
 - ◆ Solvent regeneration
 - ◆ CO₂ compression and dehydration
 - Based on technology used at Petra Nova



PROJECT DETAILS – CAPTURE INTEGRATION

- Fully integrated steam supply system
 - IP/LP crossover
- 95% capture on MRY2 entire flue gas stream
 - 12,157 tons/day
- Solvent reclaiming
 - Based on field tests
- Aerosol mitigation technology
 - Aerosol impacts based on testing



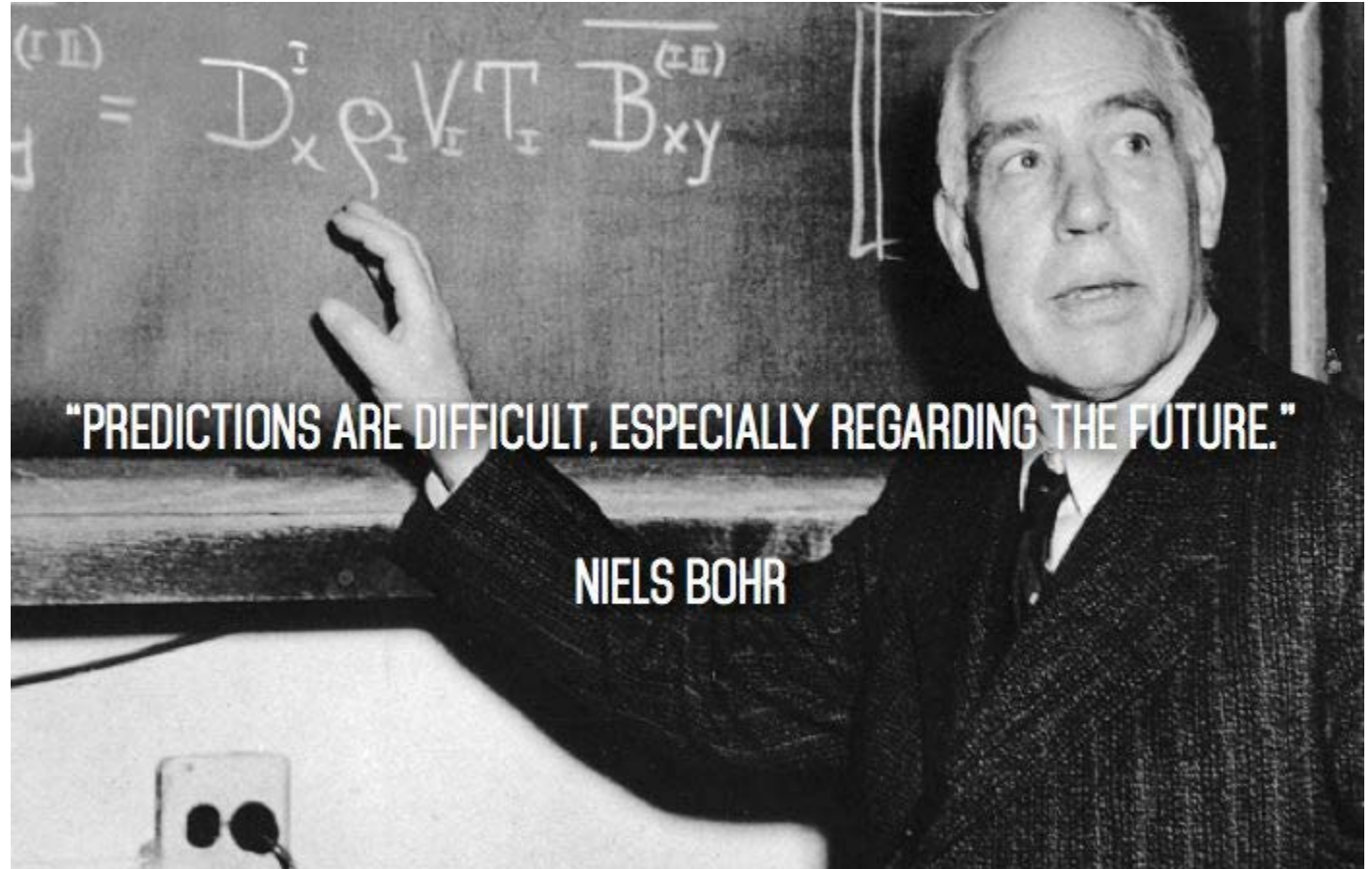
PROGRESS TO DATE

- Project design basis nearing completion.
 - 95% capture on entire flue gas stream
 - 12,157 tons/day
- Preparation for testing at MRY2.
 - Site visit
 - Test plan development
 - System integration with baghouse



FUTURE WORK

- Finalize project design basis.
 - 1 month out
- Balance of plant
 - Steam study
 - Permitting
- Install test equipment at MRY2.
 - Fall 2018
- Initiate pre-FEED cost analysis.



CONTACT INFORMATION

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